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(71) Applicant: ANSELL EDMONT INDUSTRIAL INC. [US/US]; 1300 Walnut Street, Coshocton, OH 43812 (US).

(72) Inventors: LESSARD, Daniel; 110 Toynbee Cr., Kitchener, Ontario N2N 1R9 (CA). HANDFIELD, Robert; 122 Paul Sauve, Cowansville, Quebec J2K 3G5 (CA).

(74) Agents: RUPP, Brian, C. et al.; Gardner, Carton & Douglas, Suite 3400, 321 N. Clark Street, Chicago, IL 60610-4795 (US).

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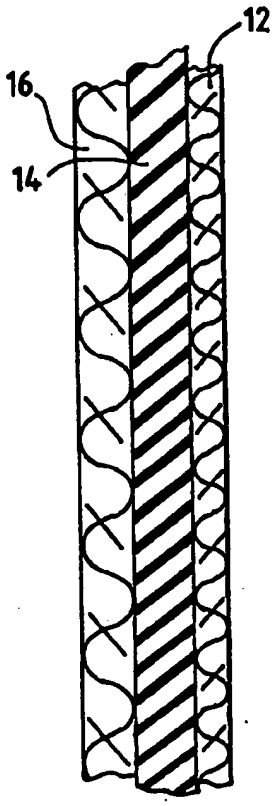
(54) Title: WEARING APPAREL WITH IMPROVED GRIPABILITY AND SLIP-RESISTANCE

(57) Abstract

Wearing apparel (10) with improved gripability and slip-resistance particularly in oily, greasy or other slippery environment. Fabric (22) for the improved wearing apparel (10) is preferably comprised of three layers: an outer absorbent layer (16), such as of terry cloth, an intermediate protective layer (14), such as a foamed or unfoamed laminate, and an inner comfort layer (12). The fabric (22) simultaneously absorbs away grease, oil or other liquids to substantially improve gripability and also provides a durable, abrasion-resistant, cut-resistant and slip- or skid-resistant gripping surface.



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WEARING APPAREL WITH IMPROVED GRIPABILITY AND SLIP-RESISTANCE

Field of the Invention

The present invention relates generally to articles of wearing apparel and relates more particularly to slip- or skid-resistant wearing apparel which is particularly effective in oily, greasy or other slippery environments.

Background of the Invention

The present invention relates to wearing apparel, such as a work glove, that provides a protective and slip- or skid-resistant gripping surface useful, for example, to allow a worker to securely and safely handle objects or control machinery which may be slippery from oil, grease, water or other agents. The prior art proposes several different types of materials for fabricating wearing apparel, including, for example, cotton, leather, synthetic and natural rubber and plastic. Such prior art fabrics suffer from several inherent deficiencies, including lack of gripability, insufficient durability and inadequate protection for the wearer.

Cotton gloves, for example, are effective to absorb oil away from a surface being handled and provide adequate grip for relatively short periods of time. Such gloves, however, quickly become saturated and permit the penetration of oil to a wearer's hand. Moreover, cotton gloves possess substantially no cut or abrasion resistance. Thus, such gloves tend to last for only short periods of time before being reconditioned or discarded due to excessive wear.

Leather gloves, on the other hand, typically are very durable, provide significant protection for the wearer and provide enhanced gripability in a relatively dry environment. When wet, or when used in a relatively slippery environment, the gripability, and sometimes the cut and abrasion protection, of leather gloves is very unsatisfactory, sometimes even promoting the slippery aspect of the environment. In addition, leather provides almost no protection from penetration of oil or other liquids.

Synthetic materials, such as rubber or plastic, typically provide adequate protection against cuts and abrasions in a relatively dry environment and usually may be fabricated to prevent penetration of liquids. In applications involving even light oil or other liquids, however, the gripability of such synthetic gloves is very poor due to the inherent liquid repellent characteristics of the material. Even synthetic gloves which have been fabricated with a textured surface become very slippery when exposed to a liquid such as oil or grease. The characteristics of natural rubber are similar, but in some cases suffer from the additional deficiency of rapid deterioration because of the tendency to break down in oil. Furthermore,

the cut and abrasion protection provided by such synthetic materials and natural rubber may be substantially reduced when the materials are exposed to a liquid.

U.S. patent No. 4,515,851 to Johnson for "Slip Resistant Surfaces" discloses an improved slip- and skid-resistant fabric comprised of foamed surface laminated to a substrate. The characteristics of the foamed layer operate to absorb, for example, oil, grease or water, and thereby provide improved gripability. Manufacture of such a fabric is relatively expensive, however, and the foaming of the laminate, whether performed mechanically or chemically, is relatively difficult and has a very narrow tolerance or margin of error to provide a foamed layer with the desired characteristics. For example, over-foaming or under-foaming can result in a fabric with substantially different, and in some cases undesirable, gripability.

Due to the deficiencies inherent in such prior art materials, wearing apparel fabricated from such material can only be used in oily or slippery environments for substantially short periods of time before becoming ineffective. Heretofore, frequent and costly changing of such prior art wearing apparel has been the only solution when working in an oily or slippery environment.

Summary of the Invention

It is an object of the invention to provide an improved fabric which provides enhanced gripability in an oily or slippery environment.

It is another object of the invention to provide such an improved fabric which is durable and provides cut and abrasion protection.

It is another object of the invention to provide such an improved fabric which is substantially liquid repellent.

It is another object of the invention to provide such an improved fabric which may be cost-effectively manufactured.

It is a more specific object of the invention to combine the absorbent properties of cotton with the cut resistant, abrasion resistant, and liquid repellent properties of synthetic materials.

It is another object of the invention to fabricate a glove which is capable of absorbing oil away from the surface of an object being handled, thus increasing the gripping ability of the glove, and which protects the wearer's hands.

The foregoing and additional objects are realized in the present invention which provides improved wearing apparel capable of providing substantially enhanced gripability in oily or greasy environments. The present invention simultaneously absorbs grease, oil or other liquids and provides a durable, abrasion resistant, cut resistant and slip- or skid-resistant gripping surface. Recognizing the significant absorptive properties of cotton and the significant protective and liquid repellent qualities of other materials, such as synthetic

nitrile, the present invention advantageously provides a fabric comprised of a combination of such materials, resulting in a fabric with substantially and surprisingly improved gripability, protective qualities and liquid repellent properties.

According to one embodiment of the invention, the new apparel is preferably comprised of three layers: an outer layer of cotton terry cloth, an intermediate laminate layer of natural or synthetic rubber to protect the wearer from cuts and abrasions and an inner layer to provide comfort for the wearer by precluding direct contact with the intermediate laminate layer. The outer layer is preferably comprised of an absorptive material, such as a layer of cotton terry fabric, which effectively absorbs moisture or liquid in order to provide an enhanced gripping surface. The intermediate laminate layer, which is preferably abrasion and cut resistant as well as liquid repellent, may be comprised of a foam or other film layer disposed between the inner comfort layer and the outer cotton terry layer. Representative materials for the laminate layer include polyvinyl chloride, acrylonitrile, nitrile butadiene rubber and other natural or synthetic rubbers. The inner layer is preferably comprised of a relatively comfortable fabric web, such as a non-woven fibrous web, a knitted fabric web, a woven fabric or a cotton flocked lining.

Brief Description of the Drawings

Other objects and advantages of the invention will be apparent from the following detailed description and the accompanying drawings, in which:

Figure 1 is a cross-section view taken at 1-1 in Figure 3, illustrating the various layers of a fabric according to a preferred embodiment of the present invention;

Figure 2 is a back perspective view illustrating a glove according to a preferred embodiment of the present invention; and

Figure 3 is a palm perspective view partially broken away of a glove according to a preferred embodiment of the present invention.

Detailed Description of the Invention

While the invention is susceptible to various modifications and alternative forms, a certain preferred embodiment is shown by way of example in the drawings and will herein be described in detail. It should be understood, however, that it is not intended to limit the invention to the particular forms described, but to the contrary, the intention is to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the invention as defined by the appended claims.

Turning now to the drawings, Figure 1 illustrates a cross-sectional view of the various layers of the fabric of the present invention according to a preferred embodiment. In particular, the fabric is preferably comprised of an inner comfort layer 12, an intermediate laminate layer 14 and an outer absorptive layer 16. The inner comfort layer 12 is preferably comprised of a non-woven fibrous web, a knitted fabric web, or a woven fabric. As should be evident, the inner comfort layer 12, which is the portion of the fabric which comes into

contact with the skin of the wearer, may include a variety of natural or synthetic fibers or blends thereof. For example, fibrous non-woven webs may be comprised of wool, polyesters, polyamides, such as Kevlar or Nomex (products of DuPont), polyolefins, such as polypropylene and polyethylene and copolymers of acrylic acid, such as polyacrylonitrile. Alternatively, the inner comfort layer 12, may be a knitted fabric web comprised of cotton, polyester, nylon, or blends thereof. The inner comfort layer 12 may also be formed of blown cotton flocking. In any event, the inner comfort layer 12 is intended to provide a comfortable contact surface for the wearer from the intermediate laminate layer 14.

The intermediate laminate layer 14 serves several important purposes for the fabric of the present invention. In order to protect the wearer, the intermediate laminate layer 14 is preferably abrasion resistant and cut resistant. In addition, the intermediate laminate layer 14 is preferably also moisture resistant and liquid repellent in order to guard against any liquids, including oil, water or grease, penetrating through to the inner layer 12 and contacting the skin of the wearer. The intermediate layer 14 may be comprised of many different materials, or a combination of materials, which provide the desired protective qualities. For example, the intermediate layer 14 may be fabricated from a foamed laminate or film which may be applied by dipping or otherwise coating the inner comfort layer 12. The intermediate layer 14 may be comprised of nitrile, acrylonitrile, polyvinyl chloride, nitrile butadiene rubber or other natural or synthetic rubbers. In order to improve the protective characteristics and provide a "bulk" feeling for the intermediate layer 14, it may be preferable to chemically or mechanically foam the laminate before application. For example, typically the air content percentage of such a foamed laminate will range from about 10 to about 65 percent, or in some cases a lower air content percentage, such as 5 to 35 percent may be appropriate. Alternatively, depending upon the type of laminate used, the intermediate layer 14 may be applied, without foaming, merely as a protective film, or several layers of sequentially applied films. In any event, the intermediate laminate layer 14 is preferably liquid repellent and provides protection for the wearer from cuts or abrasions.

The outer absorptive layer 16 is an important feature of the present invention. According to the invention, the outer layer 16, which is preferably comprised of cotton terry cloth or similar fabric effective to absorb liquid, such as oil, water or grease, greatly enhances the gripability of a glove or other wearing apparel manufactured from the fabric of the invention. When the wearing apparel comes into contact with moisture, liquid or similar agent which normally would substantially reduce the gripability of the apparel, the absorptive characteristics of the outer layer 16 operate to absorb the slippery agent at the point of contact with the wearing apparel, thereby substantially enhancing the gripability of the wearing apparel. By way of example, when a glove is manufactured from the fabric of the present invention, such a glove may be used to carry, lift or manipulate an oil-laden tool or article much more effectively than a prior art glove. Such a surprising result is achieved

by the outer absorptive layer 16 absorbing away the coating of oil on the tool where the glove comes into contact with the tool. Thus, on the portion of the tool which is grasped, the outer absorptive layer provides a substantially improved gripping surface.

Turning now to Figures 2 and 3, there is illustrated a glove 10 which is fabricated according to a preferred embodiment of the invention. The glove 10 is shown with an outer, cotton terry cloth layer 16, an inner comfort layer 12 and an intermediate laminate layer 14, disposed between the cotton terry layer 16 and the inner comfort layer 12. The glove includes a front or palm portion 22, a backside portion 24, a thumb member 26 and individual finger members 28. Preferably the entire working surface of the glove, such as the palm portion 22 and at least the front side of the thumb and finger members, will be comprised of the unique 3-layer fabric of a preferred embodiment of the invention. In some embodiments, it may be desirable to fabricate other portions of the glove, such as the back side 24 and the cuff 30, from more conventional and less expensive material, since those portions of the glove are typically not used for gripping. In addition, it may be preferable to provide a different fabric for the back portion of the glove in order to give the glove an enhanced visual appeal and to identify and distinguish the improved glove of the present invention from a conventional glove. As illustrated, however, it is important to have substantially the entire gripping surface of the glove fabricated from the unique 3-layer fabric of a preferred embodiment of the invention.

According to an alternative embodiment of the invention, the fabric may be comprised of only two layers, where the inner comfort layer is eliminated. Thus, according to such an embodiment, the fabric will have an outer absorptive layer, which may be comprised of cotton terry cloth or similar absorptive material, and an inner protective layer, such as a laminate, which provides protection against cuts and abrasions and is preferably liquid repellent. A glove according to such an alternative embodiment will appear very similar to the glove illustrated in Figures 2 and 3, except that the inner comfort layer is omitted. Such a glove will have substantially the same gripping properties and the same protective qualities but, because of the absence of the inner comfort layer, will generally not be as comfortable as a glove according to a preferred embodiment of the invention. Omission of the inner comfort layer will, of course, result in a less expensive product.

As should be evident, wearing apparel, and in particular gloves, according to the present invention may be manufactured and assembled using a wide variety of different techniques, many of which are relatively conventional. According to a preferred embodiment, the various layers may be produced in an automated manner in a mass production line where the layers for a great plurality of gloves are sequentially, rapidly and consistently produced. Such a technique will involve use of an apparatus for conveying and manipulating a great plurality, and in some cases thousands, of individual glove formers, which are usually made from porcelain, steel or plastic, between various stations of the

production line. Thus, the inner comfort layer may be produced directly on the formers which are conveyed from one station to the next, for example, by depositing materials such as fibers, fillers, and synthetic resins to obtain an inner comfort layer of the desired characteristics. Such a technique allows the material to be engineered to suit by altering the composition, the order of application, and the method of application of ingredients that make up the inner comfort layer. In addition, specific characteristics of the material, such as breathability, moisture absorbency, thickness, tensile strength, penetration resistance, stretch characteristics, flexibility and density, may be rather precisely controlled.

The inner layer may be built up from multiple dips into various substances. For example, each former may be initially dipped into a vat containing a coagulant dip. The purpose of such a coagulant dip is to supply a release material for the subsequent removal of the finished glove from the formers. In addition, the coagulant material will de-stabilize subsequent liquid resin materials such as elastomers which may be applied to provide a tacky surface for fibers which are subsequently applied.

After the coagulant dip is applied, the formers are preferably conveyed to the next station in the production line where they pass through a hood arrangement for the application of fibers which will form the inner comfort layer. Fibers are blown onto the formers which have tacky surfaces provided by the previous coagulant dip. According to an alternative technique, before application of the fibers, the formers may be dipped into another fluid vat in order to provide a sufficiently tacky surface for fibers to adhere. The fibers may be of various lengths and compositions. Usually, however, the length of the fibers will be about 0.5 to 5 mm and may be comprised of cotton, polyester, nylon or a combination thereof. Although the denier of the fibers may vary, the denier will typically range between about 3 and 5. In some cases, it may be beneficial to add hydrated silica to the fibers in order to reduce attraction to each other so that a more even and consistent application of the fibers is provided on the formers. As should be evident, the fibers applied form the inner comfort layer of the fabric of the invention and therefore forms the internal layer of the finished product. In addition, the fibers may be useful to assist with releasing the final product from the former.

After application of the fibers, the intermediate laminate layer is applied to the formers. The intermediate laminate layer may be comprised of an elastomeric or liquid resin dip, such as polyurethane, or alternatively, a natural or synthetic rubber, such as acrylonitrile/butadiene copolymer, acrylonitrile-butadiene-styrene terpolymer, polyurethane, neoprene or polyvinyl chloride. Preferably, the intermediate laminate layer will be foamed, either mechanically or chemically, in order to provide a desirable "bulk" feeling to the final product. By varying the air content of the foamed material, the intermediate layer may be varied to provide different degrees of strength, comfort and flexibility. In any event, the air content of the foam applied to the former will preferably be adjusted to provide the desired

protection from cuts and abrasions and will preferably also be liquid repellent. In cases where a heat sensitive foam is being utilized, the formers will preferably be subjected to heat in order to cure or set the foam comprising the intermediate laminate layer.

After the application of the intermediate laminate layer, a second coagulant dip will typically be applied in order to prepare the former for application of the outermost cotton material. The coagulant dip, which is preferably in the form of a tackifying agent which may be comprised of calcium nitrate in a water or alcohol carrier, provides a medium for adherence of the cotton terry cloth applied in the next step. According to an alternative technique, the formers may be immersed into an adhesive dip to provide strength and a tacky surface for the application of the cotton terry cloth fiber. Such an adhesive dip may be comprised of any synthetic resin material, and preferably an elastomer. As should be evident, different degrees of strength and flexibility may be obtained by varying the characteristics of this adhesive material.

After application of either a coagulant dip or an adhesive dip, the formers are conveyed to the next station, such as a hood or tunnel where the outer absorptive fibers are applied. The fibers applied at this station will preferably be comprised of a cotton terry cloth type material which is effective to absorb oil, grease, water or other liquids in order to enhance the gripability of the final product. The type and length of the cotton terry fibers may be varied in order to provide a cotton terry outer layer with the desired characteristics. After this second fiber application, the formers are preferably subjected to elevated temperatures, such as by passing through an oven, to dry and cure and provide the final product which is then removed either manually or by an automated technique.

According to the substantially automated mass production technique described above, a great number of variations may be introduced to provide additional or different desired characteristics of the fabric in accordance with the present invention. For example, some of the fibers may be heat sensitive, or comprised of pre-polymers which may be finally polymerized or cross-linked by subsequent heat and/or chemical cross-linking dips. Furthermore additional steps, such as spraying, dipping or dusting steps, may be added to the process. For example, the formers may be dipped several times into an elastomeric dip or foamed dip to provide an intermediate layer which is comprised of several layers. Such a technique may be utilized to produce a glove with substantially greater protection against cuts and abrasions.

As should be evident, according to an alternative, but very similar automated production technique, wearing apparel such as gloves may be produced in an inside-out manner. That is, the outermost layer of a finished product may be first applied to the former, followed by the intermediate layer and then the innermost layer of the finished product. For example, the former may be initially dipped with a coagulant, then the outer layer may be applied by flocking with a substantially absorbent material, such as cotton terry cloth. Next,

the intermediate protective layer may be applied by dipping into a foamed or unfoamed laminate. Finally, the innermost comfort layer may be applied, possibly following application of another coagulant layer, by flocking with a material which will be comfortable for the wearer. After the innermost layer is applied, the product may be conveniently and efficiently removed from the former, such as by rolling, in an outside-to-inside manner, perhaps starting from the cuff of the glove. Thus, the final product, after being removed from the former, will have the inner comfort layer on the inside and the outer absorbent layer on the outside.

Although the foregoing automated techniques are likely the most efficient and cost-effective ways to mass produce glove according to the present invention, the fabric and resulting wearing apparel of the present invention may also be produced according to a number of alternative techniques which are probably less efficient and more labor intensive, and therefore, less economical.

According to one such alternative technique, the inner comfort layer of the glove may be produced separately, as the first step of the method for producing wearing apparel of the invention. For example, the fabric of the inner comfort layer may be stitched or woven and cut into appropriate piece configurations which are then sewn together to form the inner comfort layer of the glove. Next, an intermediate laminate layer may be added, for example, by dipping the inner comfort layer to apply a protective and liquid repellent coating. Alternatively, a sheet of the intermediate protective material may be stitched, sewn or otherwise adhered to the inner comfort layer. Similarly, the outer cotton terry cloth layer may be stitched, sewn or otherwise adhered to the intermediate protective layer to produce a glove according to the present invention.

According to another alternative technique, the inner comfort layer of the glove may be produced by a conventional automatic knitting device. Such a device automatically performs a knitting operation which produces a seemless glove, a technique which does not require the labor intensive cutting and sewing of piece configurations to produce the inner comfort layer. After the inner comfort layer is produced, the inner layer may, if not knitted directly onto a former, be secured onto a former and processed to provide the intermediate protective layer and the outer absorptive layer. As should be evident, the outer absorptive layer of a glove according to the present invention may also be produced by such a conventional automatic knitting device.

In yet another alternative, and likely even more costly technique, 3-layer material according to the present invention may be produced and then cut and sewn into the desired wearing apparel. Such a technique, of course, would result in the waste of remnants which are not used to produce the final product. In addition, for some products, such as gloves, it may be very difficult to sew or stitch together different pieces to result in a product with the desired characteristics of the present invention.

As will be understood, the foamed laminate layer, in conjunction with the outer cotton terry cloth layer, perform to advantageously and surprising enhanced gripability by absorbing oil, water or grease, while still providing very important cut and abrasion resistant and water repellent properties. Another important feature of the invention is that the advantageous gripping properties of the surface may be rather easily renewed. In the event that the outer cotton terry cloth layer becomes saturated once the glove has been used for a period of time, the glove may be squeezed to remove the oil or grease held within the outer cotton terry cloth layer. This will renew the absorptive qualities of the cotton terry cloth and as a result will renew the enhanced gripping properties of the fabric of the present invention.

What is claimed is:

1. An article of wearing apparel comprising:

a) an inner layer comprised of a protective laminate; and

b) an outer layer of substantially liquid absorbent material.

2. The article of claim 1 wherein said laminate is sandwiched between said outer layer and an innermost substrate layer.

3. The article of claim 1 wherein said laminate is comprised of a material selected from the group consisting of synthetic and natural rubber and mixtures thereof.

4. The article of claim 1 wherein said outer layer comprises cotton terry cloth.

5. The article of claim 3 wherein said laminate is comprised of a material selected from the group consisting of polyurethane, polyvinyl chloride, acrylonitrile, nitrile butadiene rubber, natural rubber, synthetic rubber and mixtures thereof.

6. The article of claim 4 wherein the laminate is comprised of a foamed layer having an air content within the range of about 10 to about 65 percent.

7. The article of claim 2 wherein said substrate layer is comprised of a fabric web.

8. The article of claim 7 wherein said fabric web is comprised of a material selected from the group consisting of woven fabric, non-woven fabric web, blown cotton flocking and knitted web material.

9. The article of claim 8 wherein said fabric web is comprised of a material selected from the group consisting of wool, polyesters, polyamides, cotton, polypropylene, polyethylene, polyacrylonitrile, nylon and mixtures thereof.

10. The article of claim 1 wherein said wearing apparel is a glove.

11. An article of wearing apparel comprising:

a) an inner layer comprised of a material selected from the group consisting of woven, non-woven, blown and knitted materials;

b) an intermediate protective laminate layer, comprised of a material selected from the group consisting of synthetic and natural rubber and mixtures thereof, and

b) an outer substantially absorptive layer comprised of substantially liquid absorbent cotton terry cloth material.

12. The article of claim 11 wherein said intermediate laminate layer is comprised of a material selected from the group consisting of polyurethane, polyvinyl chloride, acrylonitrile, nitrile butadiene rubber, natural rubber, synthetic rubber and mixtures thereof.

13. The article of claim 12 wherein the intermediate laminate layer is comprised of a foamed layer having an air content within the range of about 10 to about 65 percent.

14. The article of claim 11 wherein said fabric web is comprised of a material selected from the group consisting of wool, polyesters, polyamides, cotton, polypropylene, polyethylene, polyacrylonitrile, nylon and mixtures thereof.

15. The article of claim 11 wherein said inner layer, said outer layer and said laminate layer are stitched together.

16. The article of claim 11 wherein said inner layer, said outer layer and said laminate layer are adhered together by an adhesive agent.

17. An article of wearing apparel comprising:

a) an inner layer comprised of a material selected from the group consisting of woven, non-woven and knitted materials and further selected from the group consisting of wool, polyesters, polyamides, cotton, polypropylene, polyethylene, polyacrylonitrile, nylon and mixtures thereof;

b) a protective laminate layer, comprised of a material selected from the group consisting of synthetic and natural rubber and mixtures thereof; and

c) an outer substantially absorptive layer comprised of substantially liquid absorbent cotton terry cloth material,

wherein said laminate is comprised of a foamed material, having an air content within the range of about 10 and about 65 percent, selected from the group consisting of polyurethane, polyvinyl chloride, acrylonitrile, nitrile butadiene rubber, natural rubber, synthetic rubber and mixtures thereof; and wherein said inner layer, said outer layer and said laminate layer are adhered together by an adhesive element.

FIG. 2

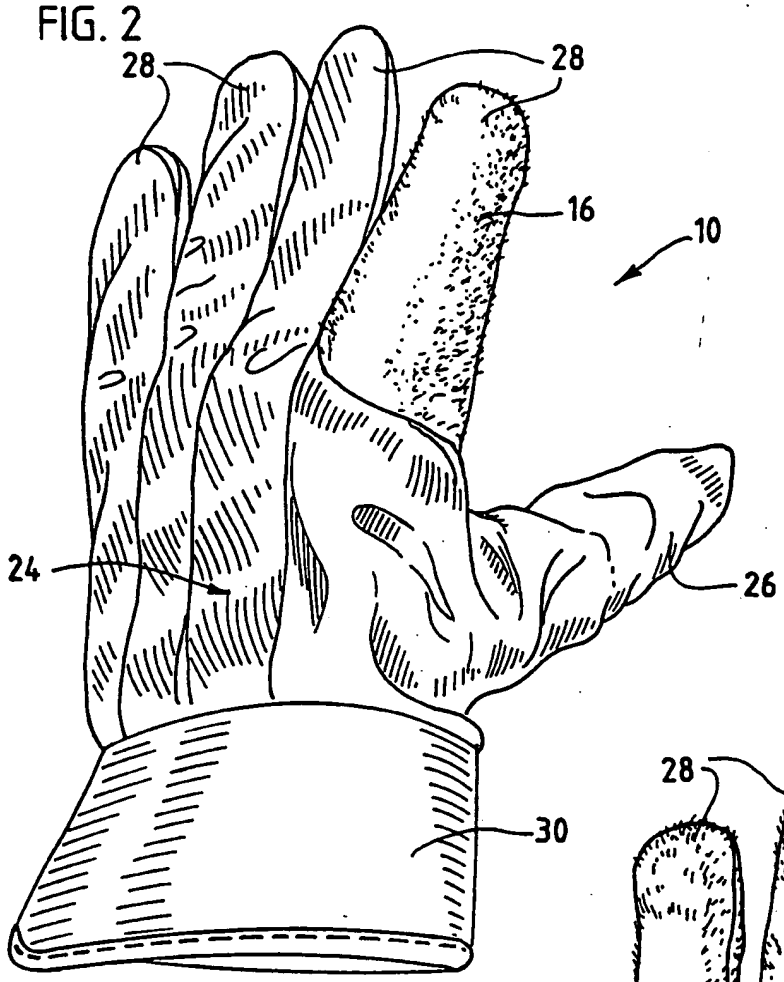
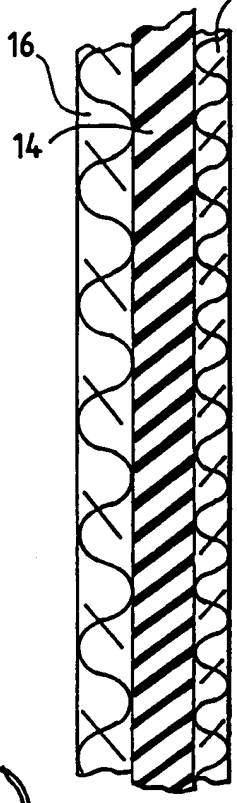


FIG. 1



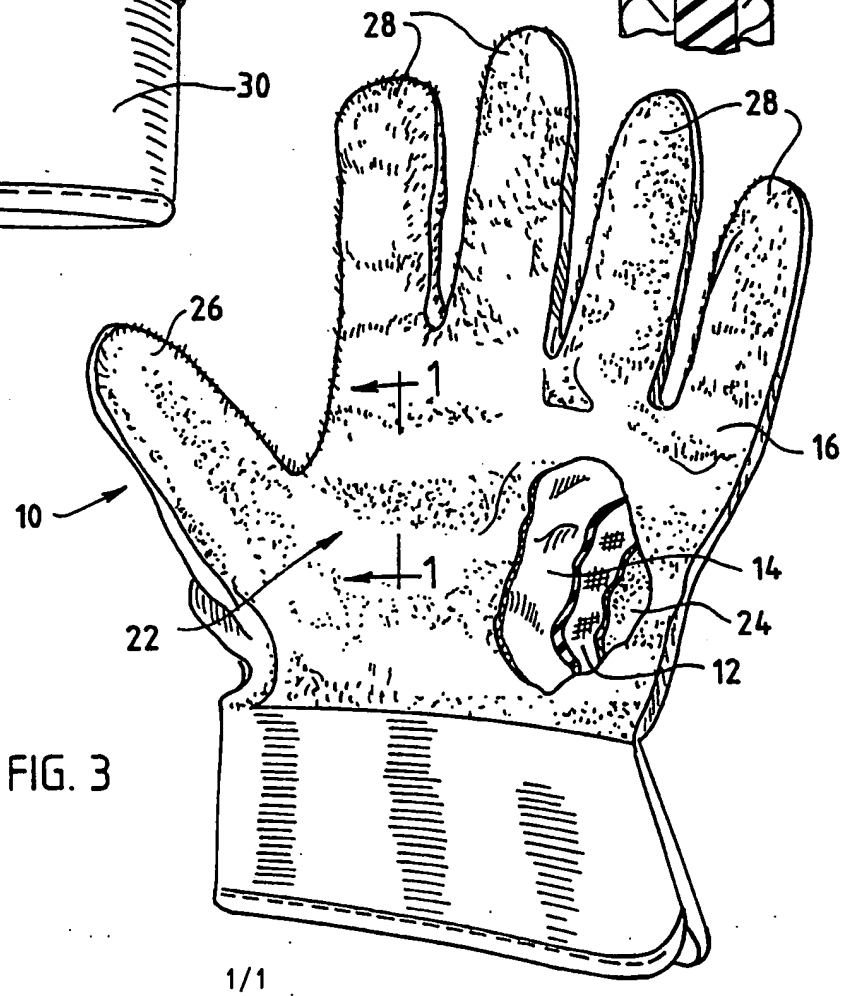


FIG. 3

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US95/03580

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) :Please See Extra Sheet.
US CL :Please See Extra Sheet.
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : Please See Extra Sheet.

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

Please See Extra Sheet.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X ---- Y	US, A, 4,531,242 (LEVINE) 30 July 1985, see Figure 4 and column 3.	1-9 & 11-17 ---------- 10
Y	US, A, 4,696,593 (BAYLESS) 29 September 1987, see entire document.	1-17
Y	US, A, 3,778,172 (MYREN) 11 December 1973, see entire document.	1-17

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

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Date of the actual completion of the international search 22 MAY 1995	Date of mailing of the international search report 16 JUN 1995
Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer TERREL MORRIS Telephone No. (703) 308-2351

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INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER:
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B. FIELDS SEARCHED
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B. FIELDS SEARCHED
Electronic data bases consulted (Name of data base and where practicable terms used):

APS
search terms: foam, textiles, terry cloth, gloves, mitts